Relaxor ferroelectric-like relaxation based on supramolecular rotor in a ferromagnetic $[MnCr(oxalate)_3]^-$ salt

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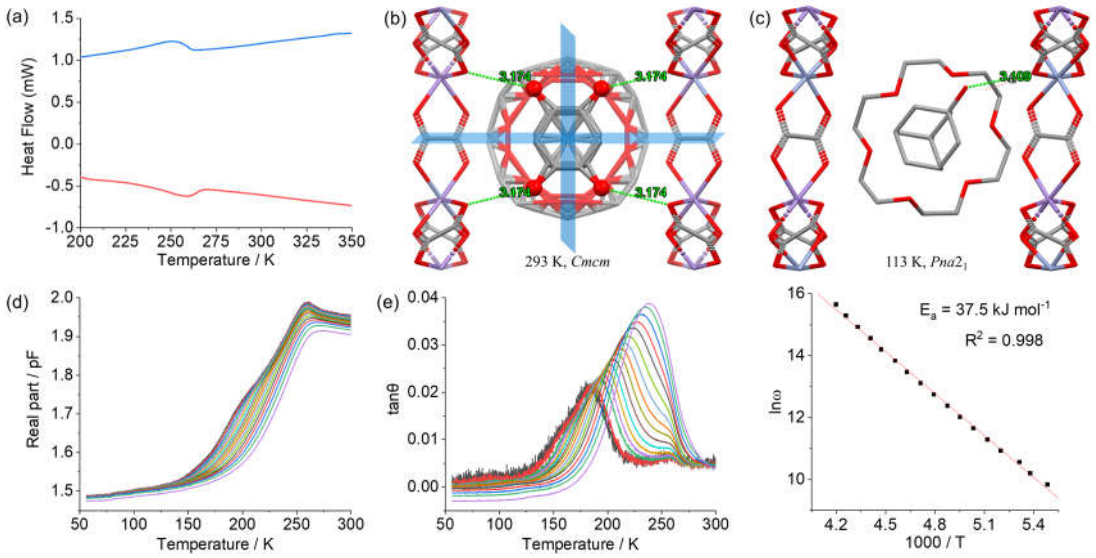
Metal oxalates have attracted extensive attention for discovering novel multi-functional materials due to its diverse intrinsic properies.[1] Multiferroics is one of the most focusing kinds in multi-functional materials due to its wide applications in sensor, actuators, memories, *etc*.[2] In this study, the dielectric relaxation resulted from the frozen-rotation of the supramolecular rotor cation, $[(HADA)(18C6)]^+$ (HADA = 3-hydroxy-1-adamantylammonium, 18C6 = 18-crown-6), in the ferromagnetic $[MnCr(oxalate)_3]^-$ anion is studied.

As shown in **Figure a**, $[(HADA)(18C6)][MnCr(oxalate)_3]$ undergoes a phase transition at around 260 K (**LTP&HTP**). Single crystal X-ray diffraction show that **LTP** crystalized in polar $Pna2_1$ with ordered cation and **HTP** crystalized in nonpolar *Cmcm* with 4-fold disordered cation. During phase transition, this material displays a dielectric relaxation in a board range with real part similar to relaxor ferroelectrics. The E_a of this relaxation calculated by imagery part is 37.5 kJ mol^{-1}, which is comparable to the E_a of hydrogen bond.

These results indicate the potential multiferroicity of this materials. Further studies is ongoing.



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